ANNUAL REPORT

1962

TOWN OF STREETSVILLE

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on the

TOWN OF STREETSVILLE

WATER POLLUTION CONTROL PLANT

OWRC PROJECT 57-S-5

TOWN OF STREETSVILLE WATER POLLUTION CONTROL PLANT

OPERATED FOR

THE TOWN OF STREETSVILLE

BY

THE ONTARIO WATER RESOURCES COMMISSION

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STREETSVILLE

I HISTORY

Streetsville is a village with a population of approximately 5200 people. It is located in the immediate vicinity of the Credit River, a stream of natural beauty used extensively for municipal water supply. The river also affords many recreational facilities.

Disposal and treatment of the village wastes prior to 1958 consisted of a sewerage system made up of street sewers and two lift stations discharging to a large septic tank, the effluent from which was discharged into the Credit after chlorination and filtration.

The municipal government of Streetsville, recognizing its responsibility in connection with pollution control to the users of the Credit River waters, and the inability of the previous system of treatment to efficiently meet the needs of a rapidly expanding community, engaged the firm of Proctor and Redfern, Consulting Engineers, to make a study and to submit a report outlining a solution to Streetsville's waste treatment problem.

The consultants recommended an extension to the previous sewage treatment plant and its conversion to a modern activated sludge treatment plant. This extension consisted of essentially a digester, primary clarifier, aeration tanks, secondary clarifier and auxiliary equipment for the activated sludge treatment process.

The Ontario Water Resources Commission, after studying the proposal, offered assistance in financing the new plant and undertook the construction and subsequent operation of the new works.

The present plant is designed for normal dry weather flow of 800,000 gallons per day. Actual flow entering the plant can be determined at any given moment by the flow gauge mounted in the machinery building.

II PLANT DESIGN DATA

(i) General

The present sewage treatment plant is of the complete treatment activated sludge type and includes influent works, primary clarifier, aeration tanks, secondary clarifier, chlorine contact chamber, digester, sludge drying beds, and auxiliary works.

Construction of the new plant commenced November 1957, and was first in service on Tuesday, October 28, 1958.

The plant has a design capacity of 800,000 Imperial Gallons per day and will serve a population of approximately 8,000 people. The population of the Village of Streetsville, Ontario in October 1958 was approximately 4,500 people.

The following description of the plant follows the flow pattern of the sewage as it passes through the plant.

(ii) Sewers and Sewage

The sewage is collected by a system of separate sanitary sewers including four pumphouses and enters the sewage treatment plant by gravity through two 12" and one 8" diameter cast iron inverted syphons.

The three inverted syphons discharge to a common manhole at the north side of the plant site which is connected to the influent works by a 14" diameter cast iron pipe.

(iii) Influent Works

At the influent works, a gate arrangement is provided to allow sewage to by-pass the new plant. Sewage may pass from the first chamber of the influent works, through a 14" cast iron pipe to the old settling tanks, then to the chlorine contact chamber and

the outfall sewer. This sewer discharges to the Credit River. By a second by-pass (12" diameter cast iron), the flow of sewage can be diverted to by-pass the influent works but will permit flow through the balance of the plant. An adjustable weir is provided in the influent works to allow storm flows in excess of the hydraulic capacity of the new plant to pass through the old settling tank, thus providing some degree of treatment for such flows.

Normally, however, the sewage passes through one of two manually cleaned bar screens, where twigs and rags are removed, then through one of the two manually cleaned grit chamber channels. Both of these channels terminate with a proportional weir which maintains a constant velocity through the grit chambers of one foot per second. These chambers have been designed to operate one at a time so that the other can be cleaned in readiness for operation.

From the grit chamber channels the sewage passes through a Parshall Flume, whereby transmitting the pressure from a point upstream from a precision built stainless steel throat, the quantity of sewage entering the plant is measured. The flows are indicated and recorded on a weekly graph by an instrument in the plant building.

From the flume, the sewage enters the last chamber of the influent works, into which the 6" supernatant line from the digester discharges. The combined raw sewage and supernatant flows then pass through a 12" diameter cast iron pipe to the influent well of the primary clarifier. This 12" C.I. feed line is valved, so that the sewage can either pass to the primary clarifier, or by-pass the clarifier to go direct to the aeration tanks or by-pass the plant completely and flow to the chlorination chamber.

(iv) Primary Clarifier

The 12" C.I. feeder line discharges into the well at the centre of the primary clarifier, 2' - 3" below the liquid level. Clarified sewage flows to the effluent launders thus to the aeration tanks.

Dorr-Oliver-Long Limited mechanical equipment scrapes settled sludge to the centre of the clarifier by means of continually moving squeegees on the bottom, which travel over the complete area of the bottom of the tank.

The raw sludge is withdrawn from the centre of the sloped bottom of the tank, through a 6" C.I. pipe, by a Balto LH Simplex Carter sludge pump, located in the basement of the Plant Building. The bottom of the scum well is connected to the suction line of the same pump. The pump is rated at 75 U.S. gallons per minute at 50 foot discharge head. The usual discharge is to the digester, however, this pump has the valved suction connected to four locations.

(1) Primary Tank bottom
(2) Scum well
(3) Old (1947) Settling Tank, and
(4) Digester bottom.

The valved discharge is connected to the following :

(1) The suction side of the pump (by-pass)
(2) The digester
(3) Sludge beds
(4) Primary clarifier inlet.

The scum well is filled by a scum skimmer arrangement, which is driven by the primary clarifier mixing mechanism.

The effluent from the primary tank passes over the primary tank weirs into collecting launders, where it flows to the aeration tanks. By a piping and valve arrangement, this effluent can be diverted into either or both of the aeration tanks, or to a by-pass line thus to the outfall sewer.

(v) Aeration Tanks

(i) Tanks

The two parallel aeration tanks are each 104' long x 17' wide, and have a common wall which carries the aeration piping. The depth of liquid in the tanks is 12' - 0" with an average detention time of 7.6 hours.

(ii) Diffusers

In each aeration tank there are 24 separately valved banks, of General Filtration and Engineering's Flo Rite Air Diffuser Assemblies (total of 96 Diffuser Assemblies).

(iii) Blowers

There are two Rotary Positive Blowers each with a capacity of 760 c.f.m. at 7.0 p.s.i.g. when operating at approximately 1800 r.p.m. and requiring 30.0 h.p. An air intake is provided on the south side of the building and an inlet silencer in the building basement.

The system is designed for single blower operation. The second blower is a standby unit and the two normally should not be operated together.

(vi) Secondary Clarifier

The effluent from the aeration tanks flows to the inlet well of the secondary clarifier. The activated sludge is then settled by gravity. The clear effluent passes over the V-notched weirs at the periphery of the tank and is collected in the outside launders. From the launders, it travels through 12" and 14" Cast iron pipes to the chlorine contact chamber.

The secondary clarifier is equipped with a sludge scraper mechanism similar to the primary clarifier but without the scum removal mechanism.

(vii) Chlorine Contact Chamber

The effluent of the secondary clarifier enters the 10' - 0" x 20' - 0" chlorine contact chamber adjacent to the River. A chlorine diffuser located at the inlet distributes the chlorine solution across the entrance of the tank. In order to mix the chlorine solution thoroughly, there is a series of three baffles in the tank. The effluent passes under the first, over the second and under the third baffle. The detention time of this tank is 20 minutes at rated capacity.

(viii) Outfall Sewer

The effluent from the chlorination contact chamber flows to the open sand filter or to the 14" cast iron outfall sewer to the Credit River.

(ix) Effluent Filter Bed

A limited amount of the effluent from the activated sludge plant can be discharged through to the 100 ft. square open sand filter during the summer months.

The effluent from the filter bed discharges to the Credit River, by an 8" concrete outfall sewer which was installed in 1947.

(x) Sludge Return Pumps

The secondary sludge is withdrawn from the bottom of the secondary clarifier by 280 Imperial g.p.m. Smart Turner sludge return pumps, located at the north-east corner of the pumphouse basement. These centrifugal pumps are equipped with U.S. Vari-drive electric motors permitting manual adjustment of the speed. The pumps are designed for single operation and have a maximum rated capacity of 50% of the design capacity of the plant.

The above sludge return pumps discharge to the sludge division box. By adjusting the sludge division box weir, the portion of sludge wasted to the primary clarifier can be varied.

(xi) Digester

(a) Tank

The sludge from the primary clarifier, consisting of primary sludge and waste activated sludge, is taken to a closed concrete tank where anaerobic bacteriological action takes place within the sludge to break it down into more stable compounds. This concrete digestion tank is 45 feet in diameter and has a side liquor depth of 26' - 7½". The capacity of the tank is approximately 227,000 gallons.

If the digester is operating properly, the sludge will be completely digested yielding gases (collected from the dome), liquids (returned to sewage plants via supernatant line to the influent works), and digested sludge which is discharged to the sludge drying beds.

In order that the rate of digestion is carried on at an accelerated rate the temperature of the sludge within the digestion tank should be maintained at 85 to 90 degrees F. How this sludge temperature is achieved is given under paragraph (d) Recirculation Heating below.

(b) Feed

The digester tank is filled through a 6" cast iron feed line by the primary sludge pump. The sludge consists of raw sludge and scum from the primary tanks, and that portion of returned sludge which has been wasted to the primary tanks. It is extremely important that the primary tank be pumped clean of sludge, at each time of pumping. The recommended procedure is to pump the sludge at least twice a day or more frequently if necessary. This practice retards the primary tanks from becoming septic.

(c) Supernatant

As the sludge is pumped into the digester, the supernatant liquid overflows by gravity to the influent works. Overflow rings are provided at the digester to vary the gas pressure in the digester by changing the liquid level. The rings permit the overflow height adjustment to be made in increments of 1".

(d) Recirculation Heating

The sludge is recirculated automatically through the (350,000 BTU/hr) heat exchanger in the Walker Process Scotch Marine Boiler (500,000 BTU/hr), to maintain the temperature inside the digester between 85 degrees F. and 90 degrees F. Recirculation is

done through two 3" C.I. insulated lines by a Weinman-Canada Type 3 U H B centrifugal horizontal pump, capable of circulating 100 Imperial gallons per minute at a head of 35 feet.

(e) <u>Mixers</u>

The digester is equipped with one Walker Process draft tube mixer which permits the effective mixing of raw sludge with digested sludge for seeding; increases the rate of digestion; accelerates the release of the generated gas; promotes a more rapid and uniform heat exchange; and helps to retard the formation of scum, which can be an undesirable condition inside the digester.

The mixer is equipped with a 24" diameter propeller at the top of a draft tube, which is driven by a 10 h.p. motor, giving a capacity of 10,000 g.p.m. at 294 r.p.m.

(f) <u>Digested Sludge Removal</u>

The digested sludge is withdrawn from the centre of the bottom cone through a 6" C.I. sludge suction line, which is connected to the 75 U.S. g.p.m. primary sludge pump located in the pumping station. This sludge may be directed to either the sludge drying beds, or may be recirculated to the digester.

(g) <u>Gases</u>

The gases generated in the digester may be taken off at the dome apex through a 4" cast iron pipe line to the pumping station. At present the 4" cast iron

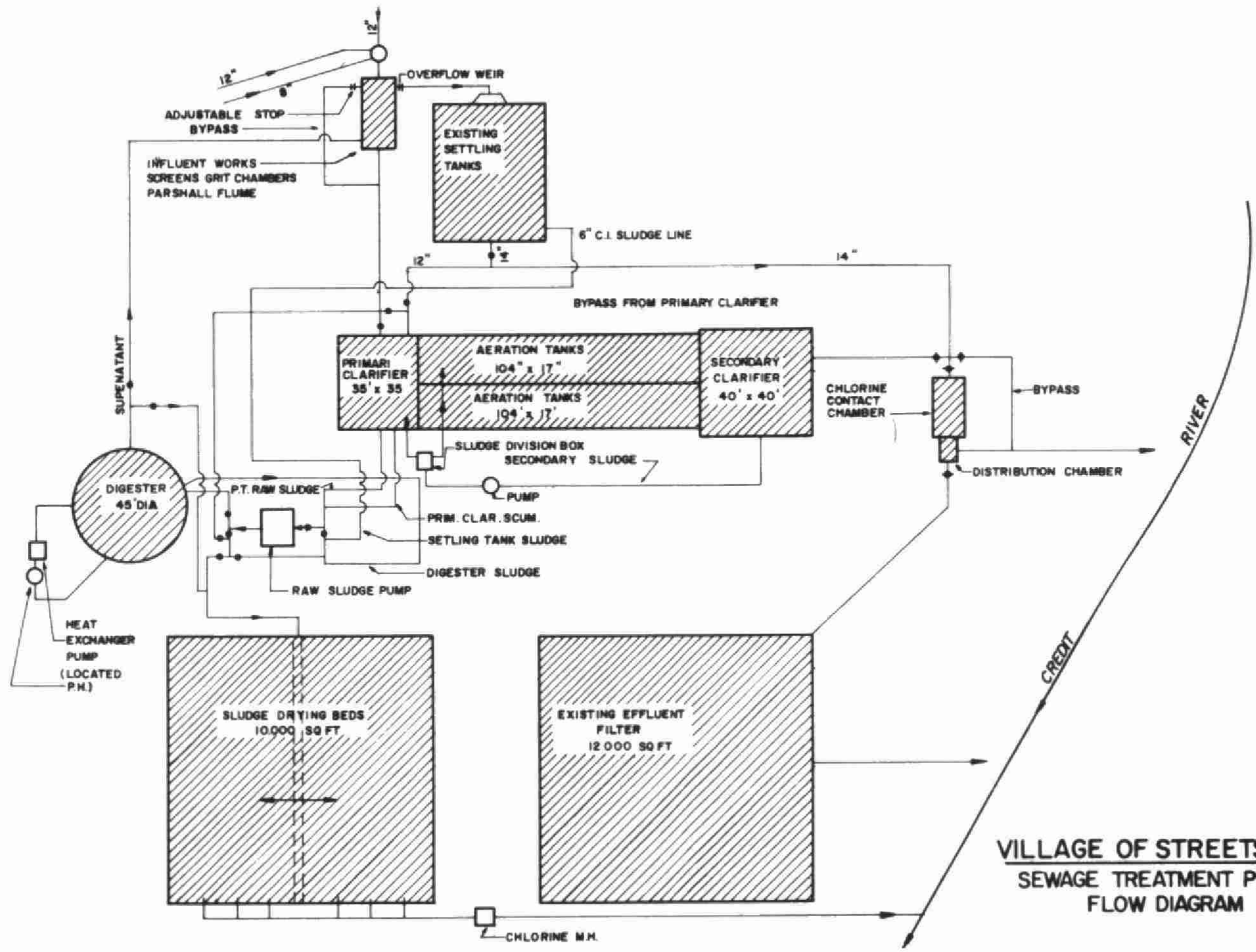
gas feed line pipe has been capped at the dome of the digester, since the anticipated amount of gas produced will not be sufficient to maintain a continuous flame in the boiler.

(xii) Sludge Drying Beds

Sludge from the digester is dried on the two open 50 ft. x 100 ft. sludge drying beds (total area 10,000 feet).

(xiii) Boiler Room

The Boiler Room is located in the basement of the plant building. In this room is located the combination type digester gas and natural gas fired boiler manufactured by Walker Process Industries which is used for heating both the buildings and the digester sludge. As previously described, the boiler is equipped with a heat exchanger through which is pumped the sludge from the digester by the electrically driven centrifugal pump located beside the boiler. In the boiler room are mounted the indicating devices for the gas pressures in the digester, line and waste gas burner, along with the temperature indicators for the digester, and the various parts of the boiler system.



DESIGN CAPACITY 800.000 I.G.P.D.

VILLAGE OF STREETSVILLE
SEWAGE TREATMENT PLANT
FLOW DIAGRAM

III PLANT OPERATION

A) HYDRAULIC LOADING

During the past year, 1962, the plant treated a total of 148.7 million gallons (see Fig. 2 and Table I). This represents an average daily flow for the year of 407,000 gallons or a per capita flow of 78 gallons per day.

The maximum and minimum daily flows recorded were on November 11th with 1.837 million gallons and July 28th with .104 million gallons per day. (see Table I)

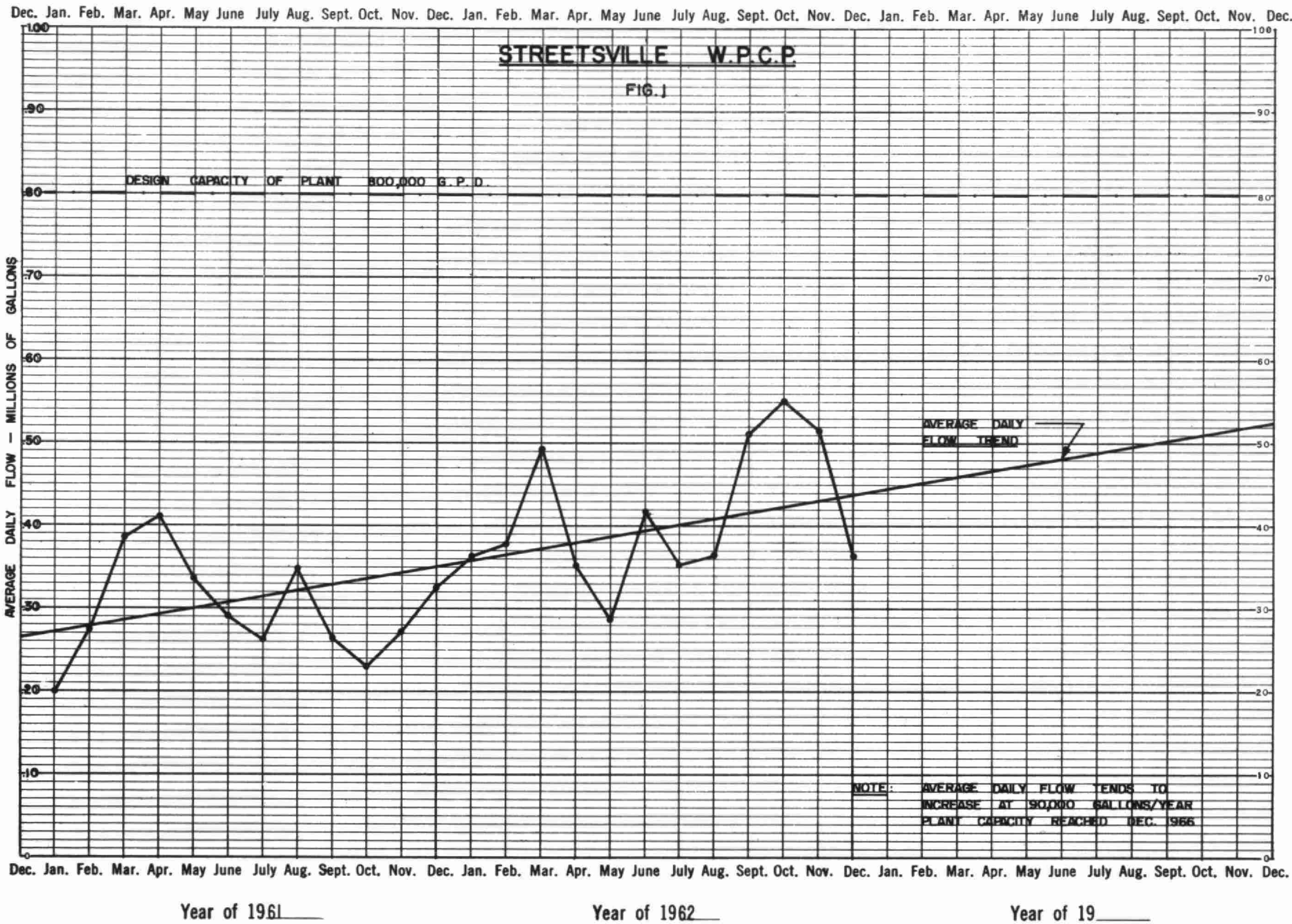
An examination of figures 1 and 2 indicates that the flow is steadily rising. There was a 57% increase in the total flow from 1961 to 1962. The average daily flow in 1961 was 260,000 gpd and in 1962 407,000 gpd. The average daily flow trend is shown on Figure 1.

Figure 3 is a probability graph showing the percent of time that the flow is equal to or greater than a certain value. Figure 3 shows that 50% of the time the flow is equal to or greater than 390,000 gpd. It also indicates that the design capacity of 800,000 gpd was exceeded 0.8% of the time.

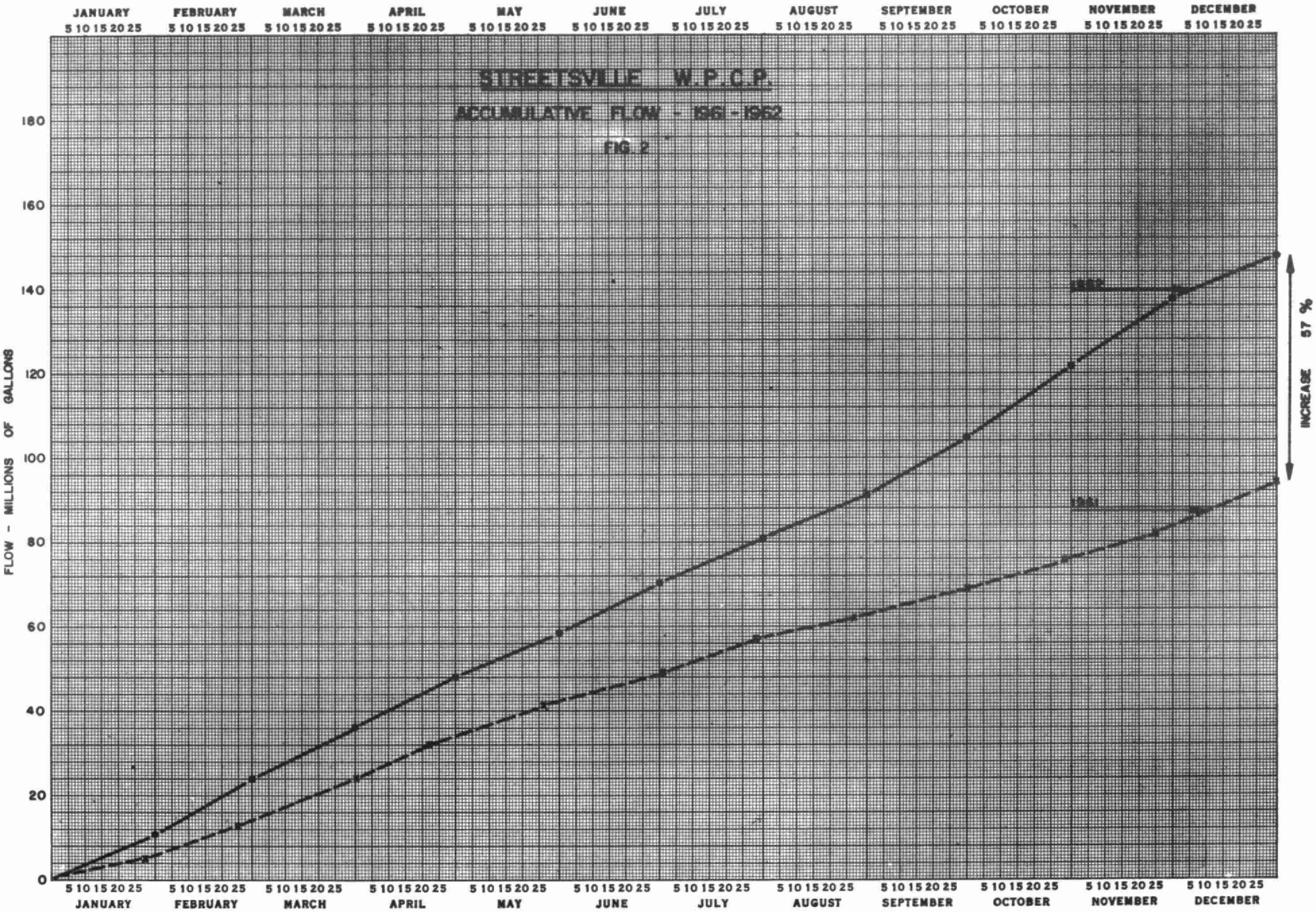
B) GRIT REMOVAL

The total amount of grit removed in 1962 was 378.3 cu.ft. This represents 2.55 cu.ft. of grit removed per million gallons of sewage treated. Details of the grit removal per month are contained in Table II.

The figure of 2.55 cu.ft. of grit removed per million gallons of sewage is comparable to that obtained from other similar installation in North America.



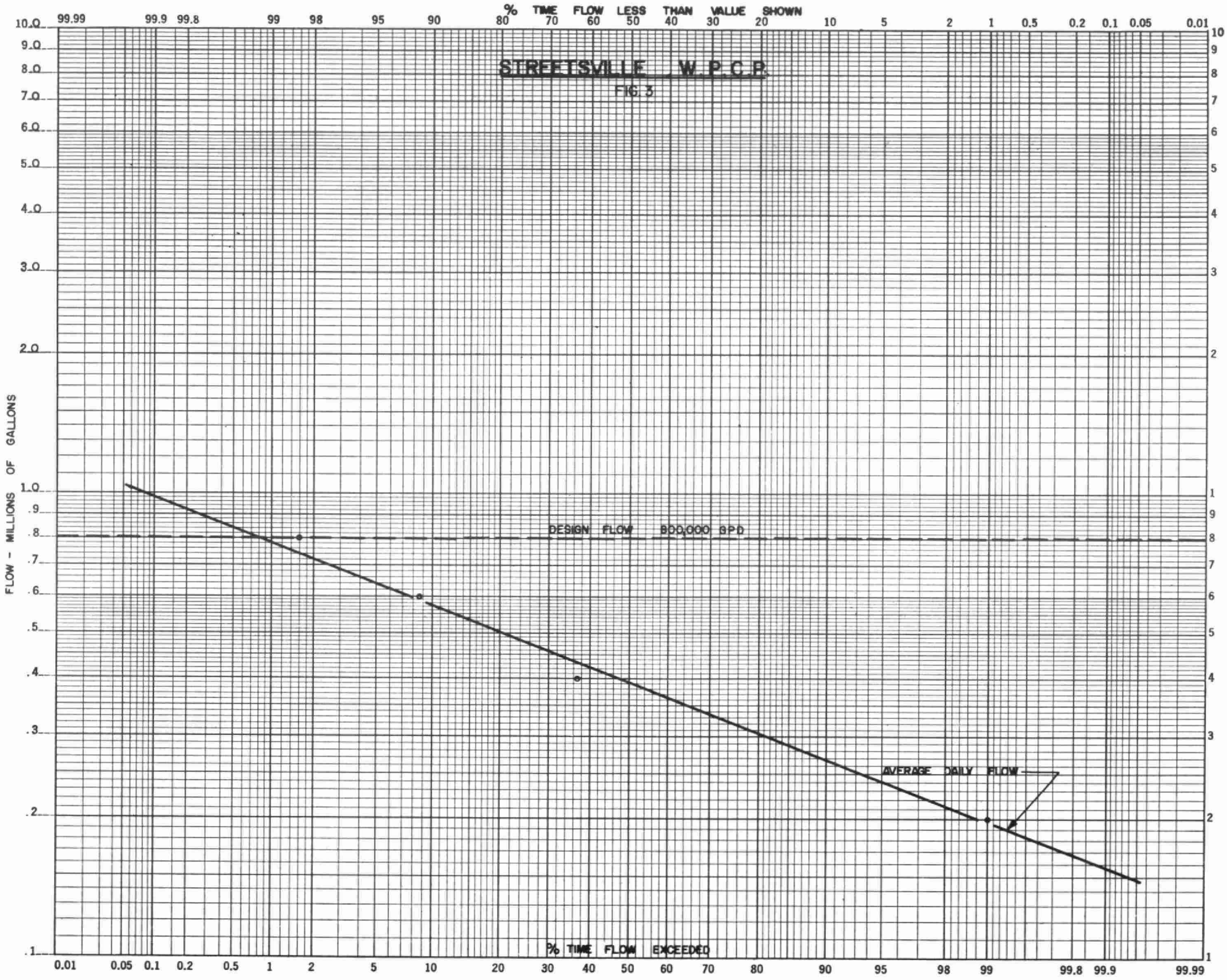
STREETSVILLE W.P.C.P.
FIG. 1
DESIGN CAPACITY OF PLANT 800,000 G.P.D.
AVERAGE DAILY FLOW - MILLIONS OF GALLONS
AVERAGE DAILY FLOW TREND
NOTE: AVERAGE DAILY FLOW TENDS TO INCREASE AT 90,000 GALLONS/YEAR
PLANT CAPACITY REACHED DEC. 1966
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1.00 .90 .80 .70 .60 .50 .40 .30 .20 .10 0
Year of 1961
Year of 1962
Year of 19



STREETSVILLE W.P.C.P.

ACCUMULATIVE FLOW - 1961 - 1962

FIG. 2



STREETSVILLE W.P.C.P.
FIG. 3
% TIME FLOW LESS THAN VALUE SHOWN
% TIME FLOW EXCEEDED
FLOW - MILLIONS OF GALLONS
DESIGN FLOW 800,000 GPD
AVERAGE DAILY FLOW

TABLE I

STREETSVILLE WATER POLLUTION CONTROL PLANT

FLOWS

WEEK ENDING	FLOW				FLOW RATE	
	TOTAL FLOW MG	AV. DAILY FLOW MGD	MAX. DAILY FLOW MGD	MIN. DAILY FLOW MGD	MAX. MGD	MIN. MGD
Jan. 6	1.764	.294	.334	.187	.65	.10
13	2.492	.356	.371	.345	.78	.12
20	2.954	.422	.712	.265	1.0	.20
27	2.802	.400	.678	.295	1.48	.15
31	1.440	.349	.460	.264	.63	.18
Feb. 3	1.006	.349	.376	.260	.63	.18
10	2.512	.359	.442	.285	1.01	.13
17	2.607	.372	.488	.288	.90	.14
24	2.658	.380	.458	.298	.77	.17
28	2.113	.464	.751	.330	1.22	.18
Mar. 3	1.129	.464	.458	.331	1.12	.14
10	2.766	.395	.409	.311	1.80	.12
17	4.839	.691	.780	.517	1.38	.12
24	3.927	.561	.894	.301	.98	.18
31	2.686	.384	.470	.274	.95	.14
Apr. 7	2.272	.325	.371	.293	.80	.15
14	3.041	.434	.600	.354	.87	.20
21	2.750	.393	.580	.265	.68	.15
28	2.170	.310	.341	.265	.59	.17
30	.546	.290	.278	.268	.47	.17
May 5	1.487	.290	.377	.230	.55	.07
12	1.812	.259	.286	.221	.75	.06
19	1.947	.278	.348	.201	.68	.07
26	2.091	.299	.384	.201	.86	.07
31	1.709	.341	.427	.267	.83	.08
June 2	.676	.341	.336	.340	.80	.08
9	3.107	.444	.729	.290	1.15	.08

CONT'D ......

WEEK ENDING	F L O W				FLOW RATE	
	TOTAL FLOW MG	AV. DAILY FLOW MGD	MAX. DAILY FLOW MGD	MIN. DAILY FLOW MGD	MAX. MGD	MIN. MGD
June 16	2.958	.423	.533	.286	1.70	.10
23	2.716	.388	.478	.327	1.05	.11
30	3.442	.496	.677	.327	1.14	.11
July 7	2.454	.351	.379	.278	1.03	.10
14	2.470	.353	.397	.296	1.20	.10
21	2.413	.345	.391	.296	.80	.06
28	2.498	.357	.580	.104	2.00	.06
31	1.053	.346	.351	.351	.60	.15
Aug. 4	1.370	.346	.358	.319	.67	.07
11	2.673	.382	.529	.218	1.85	.10
18	2.537	.362	.473	.290	1.3	.11
25	2.360	.337	.386	.286	.68	.10
31	2.567	.424	.660	.338	1.09	.11
Sept.1	.401	.424	.401	.401	.72	.17
8	2.420	.346	.487	.286	.68	.12
15	2.865	.409	.620	.308	1.25	.14
22	2.906	.415	.512	.372	1.18	.18
29	3.108	.444	.759	.341	1.85	.15
30	.758	.545	.758	.758	1.55	.13
Oct. 6	3.054	.545	.748	.368	1.55	.13
13	3.404	.486	.748	.415	.87	.16
20	3.167	.452	.509	.397	1.30	.14
27	4.539	.648	.928	.339	1.80	.10
31	2.716	.638	.823	.538	1.22	.21

CONT'D......

WEEK ENDING		F L O W				FLOW RATE	
		TOTAL FLOW MG	AV. DAILY FLOW MGD	MAX. DAILY FLOW MGD	MIN. DAILY FLOW MGD	MAX. MGD	MIN. MGD
Oct.	6	3.054	.545	.748	.368	1.55	.13
	13	3.404	.486	.748	.415	.87	.16
	20	3.167	.452	.509	.397	1.30	.14
	27	4.539	.648	.928	.339	1.80	.10
	31	2.716	.638	.823	.538	1.22	.21
Nov.	3	1.750	.638	.714	.447	1.22	.21
	10	3.953	.565	.913	.401	2.00	.20
	17	4.859	.694	1.837	.340	2.50	.12
	24	2.625	.375	.432	.295	.78	.10
	30	2.078	.344	.374	.318	.76	.12
Dec.	1	.331	.344	.331	.331	.540	.120
	8	3.704	.529	1.112	.310	1.850	.080
	15	2.781	.397	.640	.319	.940	.090
	22	2.213	.316	.382	.220	.680	.070
	29	1.660	.237	.286	.208	.580	.070
	31	.504		.253	.251	.650	.060

TABLE II

STREETSVILLE WATER POLLUTION CONTROL PLANT

GRIT REMOVAL

MONTH	CU. FT. GRIT REMOVED	TOTAL FLOW MG	CU.FT. / M.G.
January	40	11.45	3.6
February	18	10.90	1.65
March	47	15.35	3.1
April	18.5	10.78	1.7
May	16	9.05	1.7
June	32	12.90	2.6
July	17.5	10.89	1.6
August	9.3	11.51	.85
September	16	12.46	1.3
October	82	16.88	4.8
November	71	15.26	4.7
December	11	11.19	1.0
TOTALS YEAR	378.3	148.62	2.55
AVERAGE/ MONTH	31.5	12.38	2.55

C) PLANT PERFORMANCE

Twenty six sets of samples were collected for laboratory analysis throughout the year to determine the plant performance.

The average raw sewage B.O.D. and suspended solids were 294 and 316 ppm respectively, therefore the plant received an average of 1200 pounds of B.O.D. and 1285 pounds of suspended solids per day. Figure 4 illustrates that 50% of the time the raw sewage B.O.D. is equal to or greater than 310 ppm and Figure 6 demonstrates that 50% of the time the raw sewage suspended solids is equal to or greater than 305 ppm. Figures 5 and 7 show the raw sewage B.O.D. and S.S. accumulative loadings for the year.

There is one square primary clarifier with a volume of 12,250 cu.ft. or 76,500 Imp. gallons which will provide a detention time of 2.3 hours at design flow.

The annual average daily flow was 407,000 Imp. gallons resulting in an average detention time of 4.53 hours.

The average surface settling rate was 330 Imp. gallons per sq. ft. of tank per day and the average weir overflow rate was 3180 Imp. gallons per foot of weir per day.

The primary clarifier was designed to remove 670 pounds of B.O.D. and 1250 pounds of suspended solids per day, assuming a reduction of 35% and 60% respectively. The primary removal obtained in 1962 was 28% and 19% respectively.

Figure 4 illustrates that 50% of the time the primary effluent B.O.D. is equal to or greater than 195 ppm while figure 6 shows that 50% of the time the primary effluent suspended solids is equal to or greater than 205 ppm.

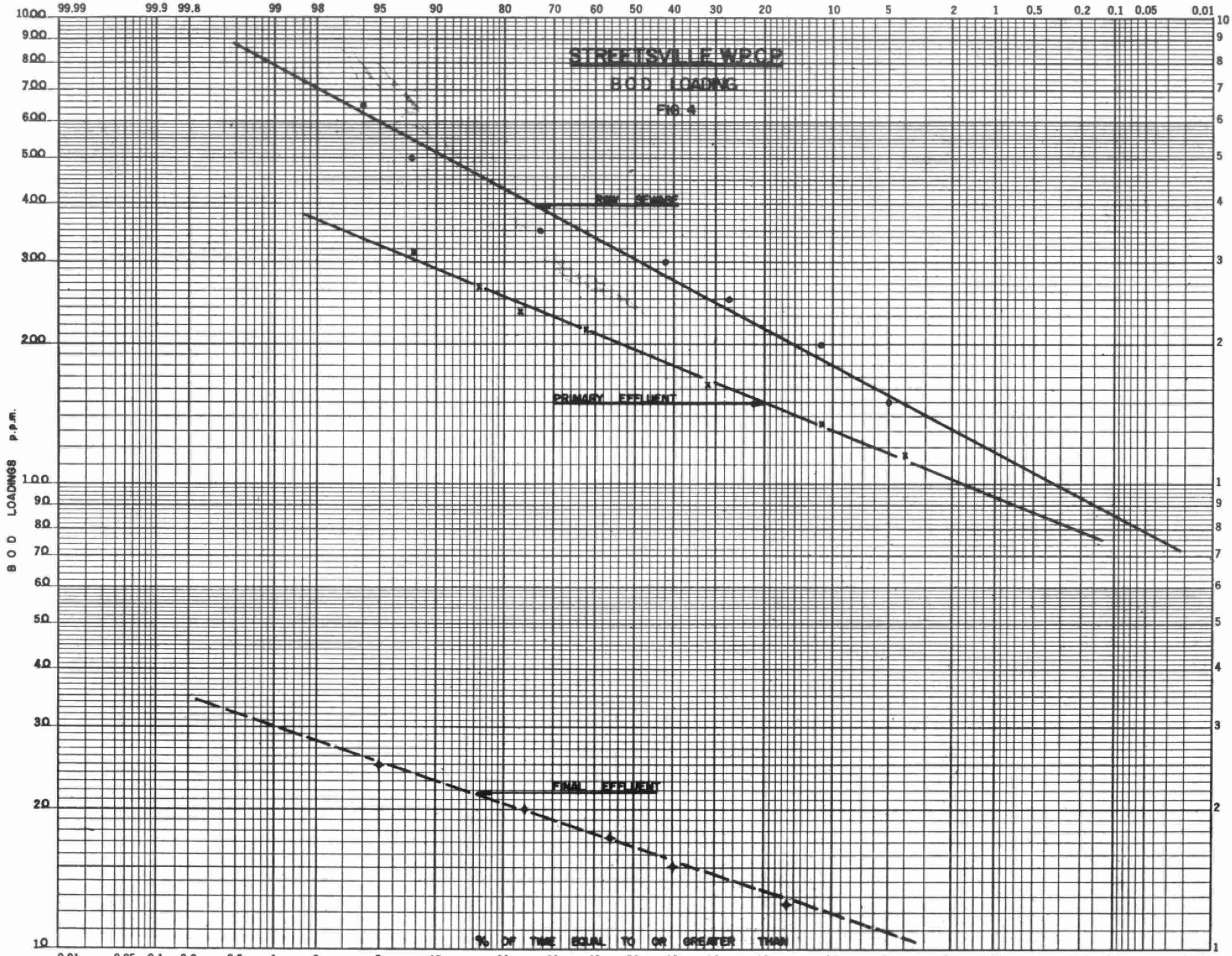
There were two aeration tanks in use during the year with a total volume of 42,400 cu.ft. or 265,000 gallons. These tanks provided a detention period of 6.35 hours for the average daily flow plus 25% return.

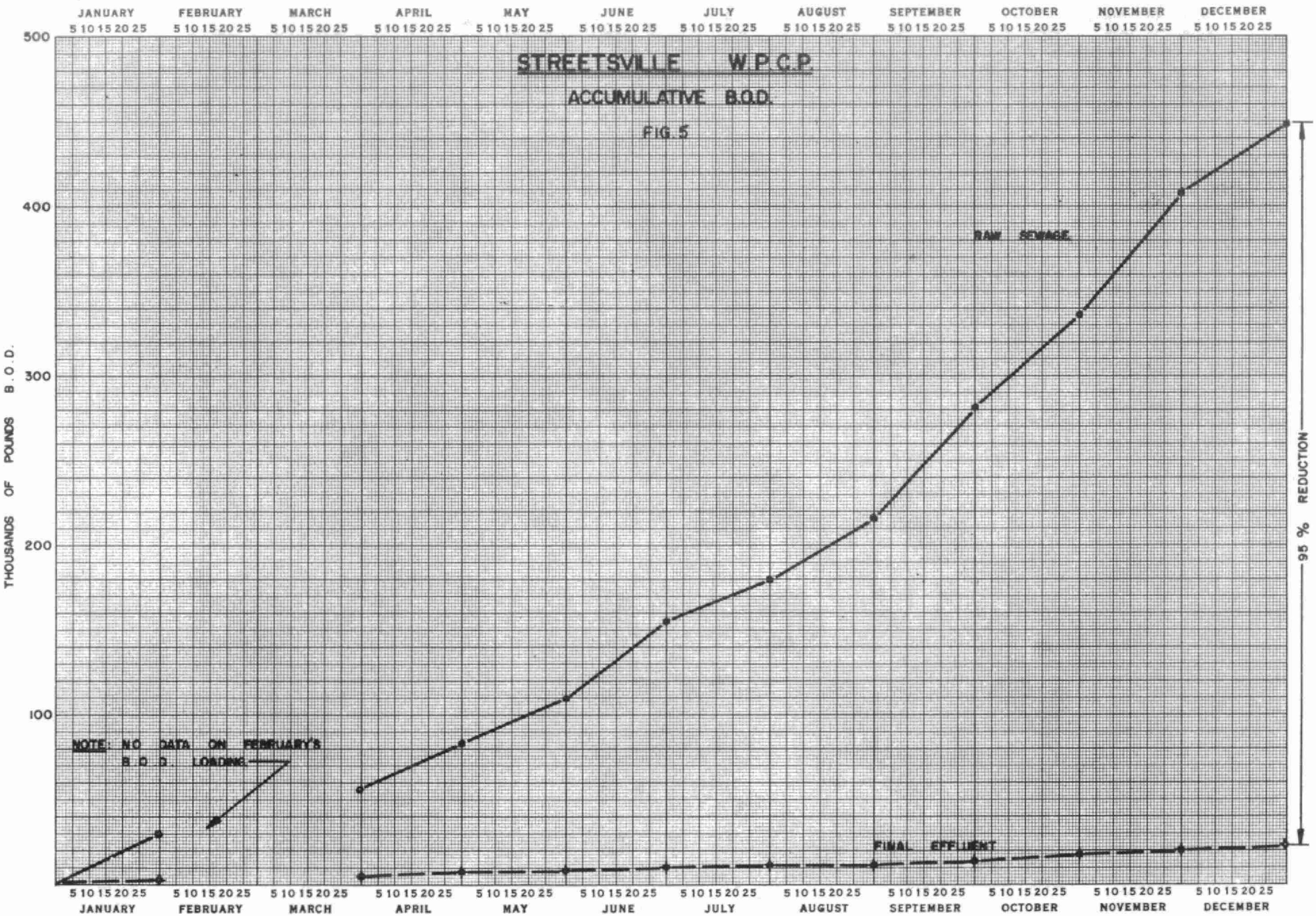
The average B.O.D. loading on the aeration section was 948 pounds per day during the year. The suspended solids in the aerator was 6700 pounds which yields an average B.O.D./S.S. ratio of 14.2 pounds B.O.D. per hundred pounds suspended solids. The average B.O.D. loading with respect to aeration tank volume was 23 pounds B.O.D. per thousand cubic feet. The average sludge age for the year was 7 days and the average air supplied was 1361 cu.ft. per pound B.O.D. removed.

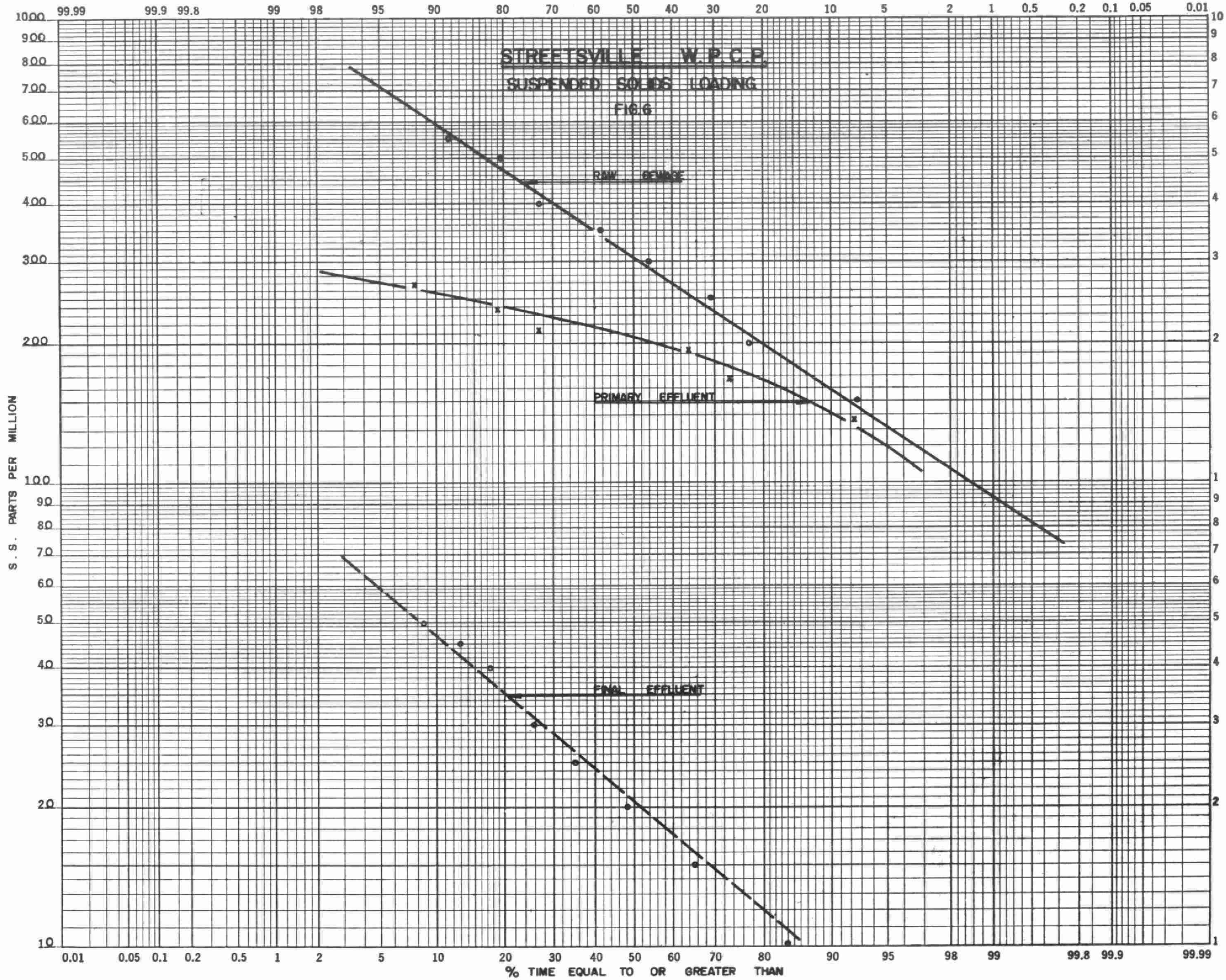
There is one square final clarifier with a volume of 13,000 cu.ft. or 80,000 Imp. gallons which will provide a detention time of 2.4 hours at design flow. The annual average daily flow was 407,000 Imp. gallons per day resulting in an average detention time of 4.7 hours.

The average surface settling rate was 318 Imp. gallons/ sq. ft. of tank/day and the average weir overflow rate was 2750 Imp. gal. per ft. of weir/day.

The plant was designed to remove 1775 pounds of B.O.D. and 1870 pounds of suspended solids per day which represents a 92.5% and 90% reduction respectively. On the basis of the samples analyzed the average overall plant B.O.D. reduction was 94% and the overall average plant suspended solids reduction was 90%.


STREETSVILLE W.P.C.P.
B.O.D. LOADING
FIG. 4
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
B O D LOADINGS p.p.m.
% OF TIME EQUAL TO OR GREATER THAN


STREETSVILLE W.P.C.P.
ACCUMULATIVE B.O.D.
FIG. 5
THOUSANDS OF POUNDS B.O.D.
500
400
300
200
100
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
RAW SEWAGE.
FINAL EFFLUENT
95 % REDUCTION
NOTE: NO DATA ON FEBRUARY'S B.O.D. LOADING



STREETSVILLE W.P.C.P.
SUSPENDED SOLIDS LOADING
FIG.6
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
S. S. PARTS PER MILLION
% TIME EQUAL TO OR GREATER THAN

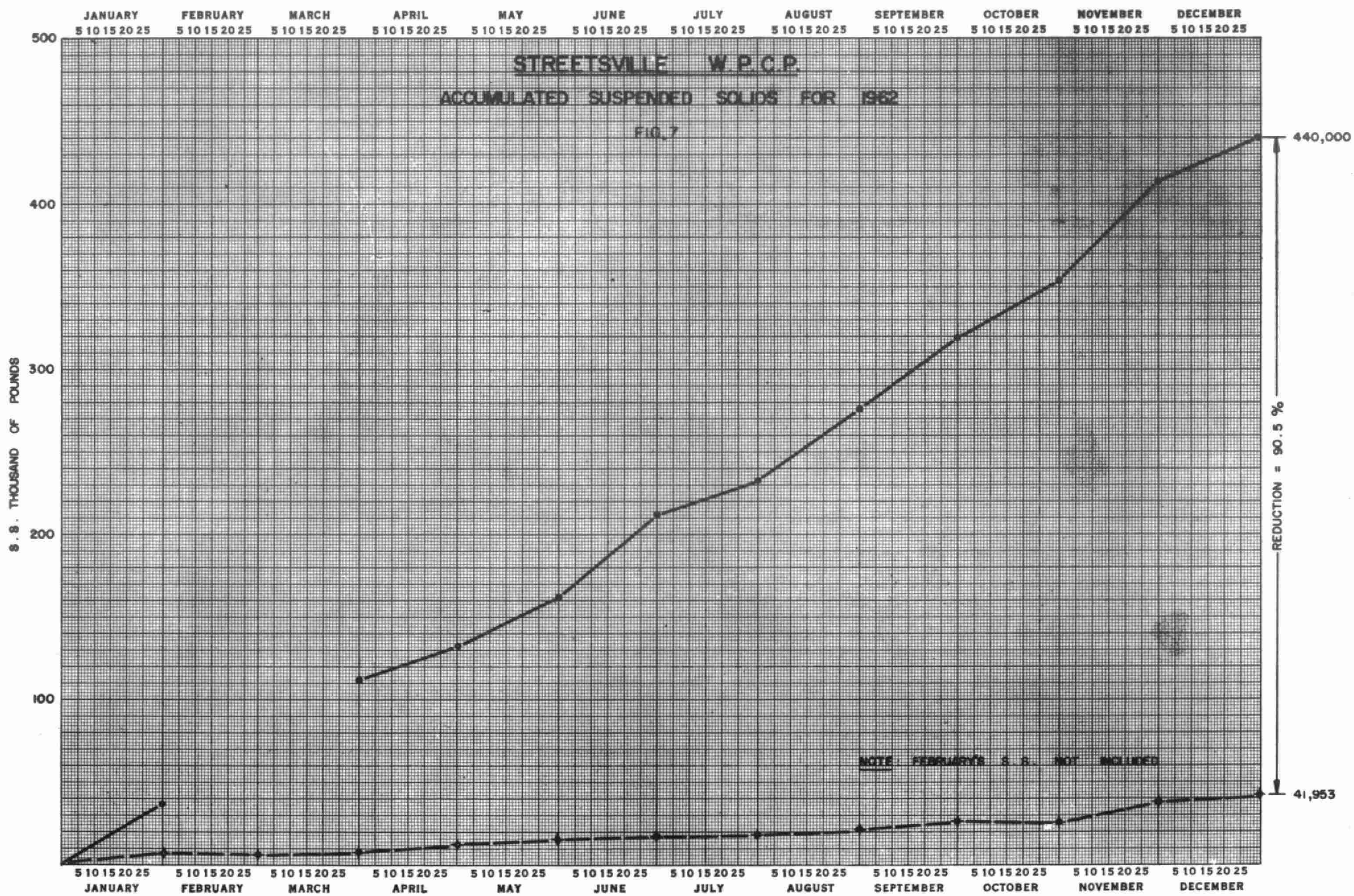

STREETSVILLE W.P.C.P.
ACCUMULATED SUSPENDED SOLIDS FOR 1962
FIG. 7
S.S. THOUSAND OF POUNDS
500
400
300
200
100
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
440,000
41,953
REDUCTION = 90.5 %
NOTE: FEBRUARY'S S.S. NOT INCLUDED

Figure 4 illustrates that 50% of the time the final effluent B.O.D. is equal to or greater than 17 ppm, while figure 6 shows that 50% of the time the final effluent suspended solids is equal to or greater than 20 ppm.

The OWRC objective for secondary treatment plants is that the B.O.D. and S.S. in the final effluent should not exceed 15 ppm. Examination of figures 4 and 6 shows the Streetsville Water Pollution Control Plant meets this objective 34% and 32% of the time respectively.

D) CHLORINATION

Chlorination of the final effluent was carried out between May 14th and November 12th, 1962. A total of 3522 pounds of chlorine was required to treat 77.082 million gallons of sewage during the above period. This represents an average chlorine dosage of 4.6 ppm.

The chlorine contact chamber has a volume of 11,000 gallons which provides a 20 minute contact time at design flow. For the 1962 average daily flow of 407,000 gallons, the average contact time was 39.4 minutes. Chlorination data is given in Table V.

TABLE III

STREETSVILLE WATER POLLUTION CONTROL PLANT

BOD LOADINGS & REMOVALS

MONTH	RAW SEWAGE BOD		PRIM. EFF.		PRIMARY REMOVAL		FINAL EFFLUENT		TOTAL REMOVAL	
	PPM	LB/DAY	PPM	LB/DAY	LB/DAY	%	PPM	LB/DAY	LBS	%
Jan.	260	930	370	1360	+ 460	+42.5	24	88	860	90.5
Feb.	-	-	-	-	No	Record	-	-	-	-
March	170	830	134	660	170	21	14	69	761	91.5
Apr.	231	880	167	600	280	27	21	76	804	90.5
May	303	880	380	1100	+ 220	+25	19	55	825	94
June	348	1500	199	850	650	43	14	61	1439	95
July	243	850	198	690	170	18.5	5.7	20	830	97.5
Aug.	322	1180	197	730	450	38.6	5.5	20	1160	97.5
Sept.	533	2200	278	1150	1050	46.5	21	87	2113	96
Oct.	335	1780	232	1260	520	29.5	30	163	1617	89
Nov.	480	2420	225	1130	1290	53	7.2	36	2384	98
Dec.	272	1256	192	873	383	69.5	19	87	1169	93
AVERAGE	294	1305	230	946			16	70	1270	

TABLE IV

STREETSVILLE WATER POLLUTION CONTROL PLANT

S.S. LOADINGS & REMOVALS

MONTH	RAW SEWAGE		PRIM.EFF.		PRIM.REMOVAL		FINAL EFF.		TOTAL REMOVAL	
	PPM	LBS/DAY	PPM	LBS/DAY	LBS/DAY	%	PPM	LBS/DAY	LBS	%
Jan.	324	1200	624	2300	+ 1100	+Inc. 92	52	190	1010	84
Feb.	-	-	-	No	Record	-	-	-	-	-
Mar.	484	2400	216	1070	1330	55.5	16	79	2321	97
Apr.	192	690	193	695	+ 5	Inc. +0.7	40	143	547	79
May	335	975	630	1840	+ 1210	Inc. +125	21	61	914	94
June	393	1690	213	920	770	45.5	14	60	1630	95.5
July	189	655	192	670	+ 15	Inc. +2	20	70	585	89
Aug.	375	1390	225	835	555	39.5	23	85	1305	94
Sept.	353	1465	222	920	545	36.5	26	108	1357	98
Oct.	205	1075	140	760	315	29.3	6	33	1042	97
Nov.	390	1980	203	1030	950	48	77	392	1588	80
Dec.	241	866	179	633	233	27	43	155	711	82
AVERAGE:	316	1308	211	1061			31			

TABLE V

STREETSVILLE WATER POLLUTION CONTROL PLANT

CHLORINATION DATA

MONTH	CHLORINE USED (LBS)	FLOW (M. G.)	DOSAGE
May	430	5.347	8.0
June	710	12.899	7.1
July	579	10.888	5.3
August	626	11.507	5.4
September	364	12.458	2.9
October	711	16.880	4.2
November	102	7.103 (approx.)	1.4
December	-	-	-
AVERAGE:	3522	77.082	4.6

NOTE: Chlorination commenced May 14 and ceased November 12th.

E) SLUDGE DISPOSAL

Sludge disposal at the Streetsville plant is by means of sludge drying beds of which there are 10,000 sq.ft. The raw sludge from the primary tank is pumped to the digester where, through a process of mechanical agitation in the presence of heat, the sludge is digested by bacterial action. The digested sludge is then withdrawn from the digester and placed on the drying beds where, after a period of drying, it is removed and disposed of as a soil conditioner.

F) PLANT SUPERVISION

The plant receives 40 hour supervision per week from Mr. R. Dadd, the plant operator. Mr. Dadd is assisted by Mr. R. Jess who is employed on a part time basis. The 40 hours of supervision is arranged in such a manner as to provide for inspections on Saturdays and Sundays.

Daily laboratory tests are carried out by Mr. Dadd in order to control the process. Routine samples are also collected and submitted to the laboratory for analysis. Mr. Dadd is also responsible for maintaining all the equipment, grounds, and buildings.

The operation of the project is under the supervision of the Division of Plant Operations. During the year approximately 20 visits were made by the head office project engineer, 3 visits by head office electronics staff, and 16 by head office maintenance. Approximately 22 purchase orders were handled by head office staff during the year.

There is no charge to the plant for any of the above services.

IV COST DATA

A) CAPITAL COSTS

The capital cost of this project was $315,500. which includes the cost of the original plant $ 35,500, plus the 1958 extension of $ 280,000.

B) RESERVE FOR CONTINGENCIES

As of December 31st, 1962 there was a total of $ 11,993.80 in the reserve fund. The money in this fund is to be used in cases of emergency or major repairs. The money in this fund is earning interest at approximately 5¼%.

C) OPERATING COST

The following is the operating costs for the year 1962 together with actual expenditures. A more detailed break-down of costs will be found in Table VII.

Item	Budget	Expenditure
Payroll	$ 3,600.	* 4,343.86
Casual Payroll	2,000.	2,091.67
Superannuation	200.	
Fuel	800.	725.61
Power	1,800.	1,836.70
Chemicals	1,200.	810.74
General Supplies	300.	450.34
Equipment	600.	139.00
Maintenance & Repairs	200.	136.73
Sludge Haulage	-	-

Item	Budget	Expenditure
Water	$ 300.	384.95
Sundry	400.	497.15
Contingency	1,600.	
Total:	$13,000.00	$ 11,416.75

* includes superannuation.

UNIT OPERATING COSTS

- per pound B.O.D. removed	3.4 ¢
- per pound S.S. removed	3.3 ¢
- per million gallons treated	$77.30
- per capita (5180 pop.)	$ 2.20

D) <u>TOTAL COSTS</u>

The total cost to the municipality during 1962 was as follows :-

Operating	$ 11,416.75
Debt Retirement	6,789.12
Reserve	3,057.96
Interest	15,909.00
Total	$ 37,172.93

On the basis of the population of 5180, the total annual cost of the Streetsville Water Pollution Control Plant was approximately $ 7.18 per person.

TABLE VII

PROJECT OPERATION STATEMENT

1962

PROJECT STREETSVILLE 57-S-5-

MONTH	EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINT.	SUNDRY	WATER
JANUARY	640.11	329.34	91.38	2.00	163.26		23.28			19.80	11.05
FEBRUARY	731.02	305.02	121.84	45.90	171.10		62.51			10.35	14.30
MARCH	896.32	313.38	162.28	139.44	11.05	40.54	24.70		13.00	51.18	140.75
APRIL	872.44	374.28	157.28	91.84	201.77		1.97		13.00	26.45	5.85
MAY	598.14	305.76	177.52	49.50		13.35	21.95			30.06	
JUNE	1717.22	305.76	201.39	58.12	320.65	565.07	53.88	139.00		60.05	13.30
JULY	552.91	305.76	282.10	65.20	162.40	332.78*	8.84			50.08	11.31
AUGUST	1559.60	458.64	249.73	45.98	159.63	574.03	12.26			36.03	23.30
SEPTEMBER	621.84	305.76	171.15	79.08	165.17	315.00*	119.33			36.55	59.80
OCTOBER	1466.86	305.76	145.87	27.25	154.10	615.53	14.94		49.63	110.73	43.05
NOVEMBER	401.42	305.76	148.37	36.34	162.40	350.00*	15.65			37.21	45.69
DECEMBER	1358.87	728.64	182.76	84.96	165.17		91.03		61.10	28.66	16.55
TOTAL:	11,416.75	4343.86	2091.67	725.61	1836.70	810.74	450.34	139.00	136.73	497.15	384.95

* CREDIT